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Flathead Lake Biological Station

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1948

### Biological Station Summer Session, 1948

Montana State University (Missoula, Mont.)

Flathead Lake Biological Station

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Looking North at Yellow Bay

MONTANA STATE UNIVERSITY  
**BIOLOGICAL STATION**

FLATHEAD LAKE

BIGFORK, MONTANA

**1948 SESSION**

JUNE 26 TO AUGUST 21

## STAFF

GORDON B. CASTLE, Ph.D., Professor of Zoology and Director of the Biological Station, Montana State University.

ROYAL BRUCE BRUNSON, Ph.D., Instructor in Zoology, Montana State University.

LEROY H. HARVEY, Ph.D., Instructor in Botany, Montana State University.

PHILLIP L. WRIGHT, Ph.D., Associate Professor of Zoology, Montana State University.

(Other staff members to be announced later.)

## EXECUTIVE COMMITTEE

DR. GORDON B. CASTLE, Chairman

DR. LEROY H. HARVEY

DR. ROYAL BRUCE BRUNSON



# THE BIOLOGICAL STATION OF MONTANA STATE UNIVERSITY

## Summer Session

June 26 to August 21, 1948

The Biological Station, a unit of the Summer Session of Montana State University, is a field station for teaching and research in Botany and Zoology. The first session was held in the summer of 1899, and regular classes were offered every summer through the year 1920. Formal classwork was suspended from 1920 until the summer of 1947, when rehabilitation of the Station was begun.

The Station grounds proper comprise approximately 70 acres of land at Yellow Bay on the east shore of Flathead Lake. In addition to this area, the Station controls three small bird islands and 40 acres of Idylwild Island. Permission has been granted to the Station personnel to make biological studies on Wildhorse Island, which covers some 2,000 acres. At the south end of Flathead Lake the Station controls a 40-acre plot. This area is an excellent one for the study and collection of insects and birds. Just east of the Station at the very top of the Mission Range is a plot of land, six to ten acres in extent, which is also controlled by the University.

Sixteen miles to the north of the Station is Bigfork, Montana, situated at the north end of Flathead Lake. Polson, Montana, lies at the south end of Flathead Lake, 17 miles from Yellow Bay. The Mission Mountains rise abruptly from the Station grounds to the east and south. The Swan Mountain range lies within easy driving distance to the east and north of Yellow Bay, and Glacier National Park can be reached in one and one-half hours' drive by car from the Station.

Flathead Lake is an oligotrophic lake with a definite thermocline during the summer months. It is approximately 35 miles long with an average width of 7 miles. The maximum depth is approximately 100 meters. The shore line of the lake varies considerably from precipitous, rocky shores on the east side to a sloping, sandy bottom on the south end of the lake. The Swan and Flathead Rivers empty into the lake on the north end, and the latter drains the lake at the south. Situated in the lake are many islands in addition to those already mentioned.

Within easy driving distance are mountain streams, temporary and permanent ponds, several smaller lakes and many mountain lakes in the passes of the Mission and Swan Mountains. Flathead Lake and the Station grounds are at an elevation of approximately 3000 feet. The Mission and Swan Mountain Ranges reach an altitude of about 9000 feet, and the ranges of Glacier National Park attain an altitude of 10,000 feet.

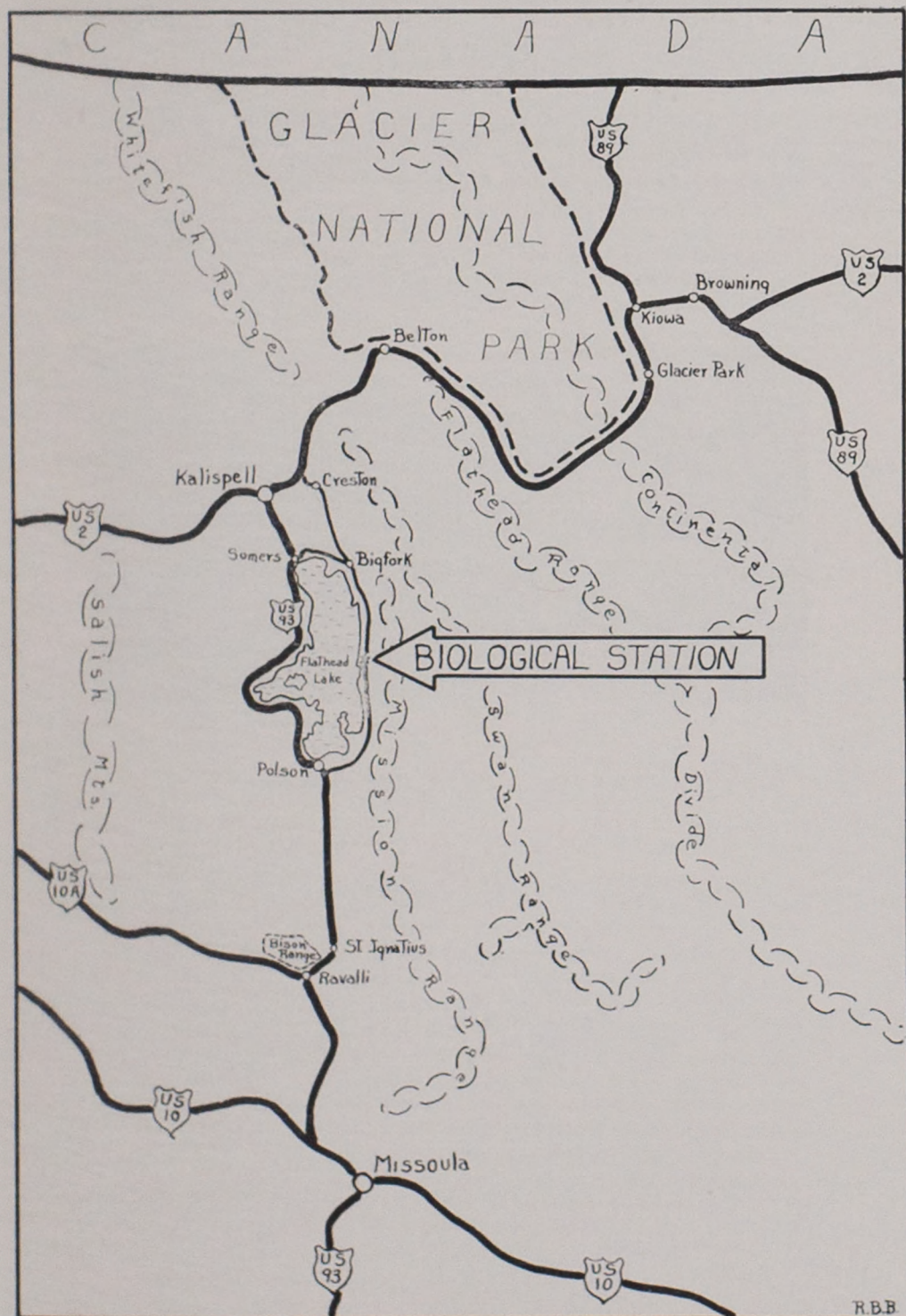
## OPPORTUNITIES FOR STUDY AND RESEARCH

This variety of habitats and range of altitude offers unlimited possibilities for research in both Botany and Zoology in three major drainage systems. The greater part of the region lies in the Columbia River drainage. The Mississippian and Hudsonian drainage systems have their headwaters in Glacier National Park and are accessible for study. This condition presents unique possibilities for research in Botany. The predominant vegetation types are those of the montane and sub-alpine forests. There are also present many fine representations of the coast forest, sage brush, grass land and tundra formations. It has long been recognized that some of the most important ecological, systematic, and phytogeographical work can be done in those localities where there is a meeting of two or more formations. Botanical research in this region to date has been almost entirely of the preliminary survey type. Thus, the possibilities for research in both the higher and lower plant groups are almost unlimited.

The possibilities for research in Zoology are equally as good. There are 75 species of mammals found in the area. Big game animals are common over the western part of Montana. Among these are the elk, moose, whitetail deer, mule deer, mountain goat, big-horn sheep and Grizzly and black bear. The National Bison Range, 40 miles from the Biological Station, supports herds of bison, elk and deer. Mammals peculiar to mountain ranges, such as the Pika and Hoary Marmot, can conveniently be studied near the Station. There are nearly 200 species of breeding birds in western Montana. Common nesting birds in the vicinity of the Station include the Western Tanager, Macgillivray's Warbler, and the little-known Townsend's Warbler. In Glacier Park, the Rosy Finch and the American Pipit are common at high elevations and the White-tailed Ptarmigan may be seen. At Nine-Pipe and Pablo Federal Migratory Bird Refuges, an hour's drive south of the Station, many species of water birds nest, of which the Avocet and the Western Grebe are striking examples. Only a few species of amphibians and reptiles are known from western Montana. An unknown number of species of fish inhabit the waters of the region. Three species of trout, the land-locked salmon, Rocky Mountain Whitefish, and many introduced species of fish are among those found in Flathead Lake. No estimate can be made as to the number of species (or genera) of invertebrates found in the region. There are many aquatic and terrestrial gastropods and an abundance of Sphaereids. Fresh water sponges occur in several of the waters. Macro-crustaceans are rare, but at least two species of phyllo-pods are known to be present. The insect fauna is rich in both numbers of species and numbers of individuals.



# FLATHEAD LAKE AND SURROUNDING AREA



## FACILITIES FOR INSTRUCTION AND RESEARCH

The physical plant of the Biological Station includes a two-story brick laboratory building and two smaller wooden laboratories. Equipment includes a launch, boats, compound and dissecting microscopes and accessories, and other items needed in laboratory work.

In the zoological collections are skins and skulls of mammals; bird skins; a small collection of preserved reptiles, amphibians, and fishes; and a small collection of invertebrates. The botanical material includes a good representative Bryophyte herbarium and a small phanerogamic collection.



Station Laboratories

## GENERAL LIVING CONDITIONS

### **Board and Lodging**

Board is provided at the Station commissary, which is under the supervision of a dietitian. All people living at the Station are required to board at the commissary.

Student and faculty housing will be in the form of screened tent houses, which have a dimension of 14 by 14 feet and which have wooden side walls and floor. Each tent house is provided with beds, mattresses, chairs, table and minor items of equipment. Blankets, pillows, towels and linen must be provided by the occupants. The tents are supplied with electric lights and electric (AC) outlets. One family or four students will occupy one tent. Groups of tent houses are set apart in various areas of the Station grounds for men, women, families and faculty. A women's counselor will supervise the women's area.

A combination bath house and latrine is centrally located and has hot showers in addition to regular wash stands. Stationary laundry tubs are available for use in both men's and women's sections of the bathhouse. A small ironing room is also available for use. No irons are supplied by the Station.



## Health

A trained nurse will be on hand at all times for treatment of minor illnesses. There are several doctors in the vicinity of the Station who are available for emergencies. Modern hospitals are available at Polson and Kalispell.

The drinking water comes from artesian springs and is piped to various parts of the Station grounds. The sanitary system includes both cesspools and septic tanks.

## Recreation

Opportunities for recreation are many. Mountain climbing, hiking, swimming, boating and fishing offer the best means of relaxation. Some of the best fishing in western United States is to be found within a few hours' drive of the Station. Fine catches of Rainbow, Cut-throat and Dolly Varden trout and Landlocked Red Salmon are made the year round in Flathead Lake. Ideal trout fishing may be had in most of the streams and rivers in the community. There are excellent Forest Service and Indian Service trails in the Mission and Swan Mountain ranges. There are also many fine trails with overnight accommodations at chalets in Glacier National Park. Community recreation will be planned for those in attendance.

## Field Trips

Transportation will be provided for class trips on a pro rata basis to the students. All field trips are under the supervision of an instructor. Transportation for Station excursions to Glacier National Park and other areas of interest will probably be supplied by the Station. Many of the field trips will be completed within one day, although one may expect to have at least one overnight trip in each course. Meals on such trips are supplied by the commissary. The Station cannot as yet offer transportation for independent research workers; however, space on scheduled field trips will be available at the same rate as that provided for students.

## FEES AND EXPENSES\*

A student fee of \$50.00 is charged for both resident and non-resident students. This includes a tent fee of \$10.50.

Resident and non-resident investigators, for whom research space and general laboratory materials will be supplied, are charged a fee of \$50.00, which includes the \$10.50 tent fee.

Dependents of students and investigators must pay a \$10.50 tent fee.

Board at the commissary is on a pro rata basis and probably will be between \$80.00 and \$100.00 for the regular session. At registration \$90.00 must be deposited with the dietitian. A refund or an extra charge will be made, depending upon changing food costs.

Inasmuch as the Biological Station is a part of Montana State University, government educational benefits to veterans under Public Laws 16 and 346 apply at the Station in the same manner as they do on the University campus. Veterans should indicate on the application blank the congressional act under which they will enroll.

Full subsistence will be paid by the Veterans Administration if enrolled for nine or more credit hours.

\*Subject to approval by the State Board of Education.





Granite Park Chalet, Glacier National Park



Garden Wall Trail, Glacier National Park



## ADMISSION AND REGISTRATION

Students who have reached the junior level in college and who have satisfactorily completed necessary course prerequisites are eligible for admission. Students of sophomore standing with the required prerequisites may petition the Executive Committee for entrance. Applications for admission to courses should be made before April 30, using the blank provided in the catalog. Additional blanks will be provided on request. Applications will be reviewed on April 30 and notifications will be mailed soon after. Applications made after that date will be considered in the order in which they are received.

Students who have not previously been enrolled at the Station must submit a complete official transcript together with recommendations from two instructors. Graduate students must first enroll in the Graduate School of Montana State University. Those students who wish to apply for admission should secure an application blank from the Dean of the Graduate School, Montana State University, Missoula, Montana.

Students must include a \$10.00 deposit with their application. This deposit will be refunded if the applicant withdraws his application before June 1. At the time of registration, this deposit will be credited to the tent fee and refunded to veterans on Government subsidy, provided this fee is paid by the Veteran's Administration. Official registration will be held at the Station on Saturday, June 26. Classwork begins Monday, June 28, and extends through the full session of 8 weeks.

## CREDITS

Credits earned at the Biological Station are transferable to other colleges and universities the same as credits earned in the Botany and Zoology Departments at the University campus. Graduate credit can be received in all courses given at the Station. Undergraduates may take only those courses numbered below 200.

## ADVANCED DEGREES

Qualified students who are officially enrolled in the Graduate School may take course work and do research at the Station toward a master's degree. Master's degrees are offered in both Botany and Zoology by the respective departments. Students interested in earning a master's degree through successive summers at the Biological Station should refer to the catalog of the University. Since exact requirements vary with the preparation of each student, each case will be considered by the department concerned and recommendations will be given to the individual student.

### **Zoology**

To receive a Master of Arts degree in Zoology for work done in part at the Biological Station, a student must fulfill the requirements of the Department of Zoology at Montana State University. These requirements are as follows:

1. Complete all work or the equivalent required for a major in the Department.
2. A minimum of one year each of collegiate botany, chemistry and physics.
3. Take the graduate record examination and, in addition, a 30-minute oral examination with each member of the staff in the Department of Zoology. These oral examinations may be waived at the discretion of the Department.
4. All work done in absentia must be approved unanimously by



all members of the Department and the Graduate Committee. Twelve credits secured in an accredited college or university may be counted toward a master's degree with Departmental approval.

5. The following specific requirements must be met:
  - a. A minimum of 10 credit hours in an acceptable cognate.
  - b. An acceptable problem must be investigated and a thesis prepared on the results of the investigation.
  - c. An oral final examination in the field of Zoology must be passed.
  - d. The residence requirement of one quarter on the Missoula campus must be fulfilled.

### Botany

Students seeking the degree of Master of Arts in Botany for work done in part at the Biological Station must fulfill the general requirements of the Graduate School as well as the following specific requirements of the Department of Botany:

1. Pass an oral and/or written qualifying examination in Botany. A waiver of this requirement may be made in certain cases on the basis of the candidate's previous record.
2. Have Departmental approval of all work done in absentia which is to be offered as part of the total credit hours for the degree.
3. Complete all courses or their equivalents required for an undergraduate major in the Department.
4. The final draft of the thesis must be approved by the Departmental staff before it is accepted.
5. It is advisable that every graduate student in Botany complete at least one summer's work at a biological station or have equivalent field experience with a governmental or private agency.
6. Each candidate's program will be individually worked out and approved.



Lakes of Hudsonian Drainage as seen from Continental Divide

## DESCRIPTION OF COURSES

Students may elect only those formal courses announced in the bulletin, but qualified students may elect work under 199 and 200. Credit is given in quarter hours, and the recommended load for students is nine hours. Maximum load for any student is twelve and the minimum load is six hours. A three-hour course meets one full day a week and a six-hour course meets two full days a week. Courses are so planned that additional work, such as preparation of reports, assigned readings, study, and conferences, occupies time outside of regular class days.

### BOTANY

- S160. **Systematic Botany.** 6 credits. **Prerequisite:** One year's collegiate laboratory course in botany or equivalent. Identification and classification of vascular plants and their ecological distribution. Principles of nomenclature, methods of collecting, mounting and preserving plants.  
Laboratory 2, Friday and Saturday. Harvey.
- S163. **Aquatic Flowering Plants.** 3 credits. **Prerequisite:** One collegiate laboratory or field course in systematic botany. Identification, classification and ecology of higher aquatic plants.  
Laboratory 2, Wednesday. Instructor to be announced.
- S164. **Agrostology.** 3 credits. **Prerequisite:** One collegiate laboratory or field course in systematic botany. Identification, classification and ecology of grasses, sedges and rushes.  
[Given in alternate years with Botany S176 (Bryophytes). Selection for 1948 will be based upon demand.]  
Laboratory 2, Tuesday. Harvey.
- S174. **Fresh Water Algae.** 3 credits. **Prerequisite:** One year's collegiate laboratory course in botany or equivalent. Identification, classification, distribution, life histories and limnological relationships of the algae of the Northern Rocky Mountains.  
Laboratory 1, Saturday. Instructor to be announced.
- S176. **Bryophytes.** 3 credits. **Prerequisite:** One year's collegiate laboratory course in botany or equivalent. Taxonomy, ecology and morphology of the mosses and liverworts of the Northern Rocky Mountains.  
(See Botany S164).  
Laboratory 2, Tuesday. Harvey.
- S199. **Special Problems in Botany.** 3 to 9 credits. **Prerequisite:** Consent of the professor. Students whose needs are not satisfied by the formally announced courses may secure advanced work in the several fields represented by the members of the teaching staff. Open to undergraduates and graduates. Staff.
- S200. **Advanced Botanical Problems.** 3 to 9 credits. **Prerequisite:** Consent of the professor in charge of the work. Directed research in any of the fields covered by the staff. Written report required. This may be converted to a form for publication if the results of the problem so warrant. Students wishing to enroll for this course should consult or correspond with the staff member under whom they wish to do their work as soon as they have been notified of their acceptance. If the problem requires special equipment, the Director should be notified before May 1 so that it may be arranged for. Staff.

### ZOOLOGY

- S108. **Ornithology.** 3 credits. **Prerequisite:** One laboratory course in vertebrate zoology. Life history, habits, identification and distribution of birds.  
Laboratory 3, Thursday. Wright.
- S109. **Mammalogy.** 6 credits. **Prerequisite:** Comparative vertebrate anatomy. The life history, habits, identification and distribution



of mammals, with particular reference to those of the Rocky Mountain region.

Laboratory 3, Wednesday, Saturday. Wright.

- S161. **Limnology.** 6 credits. **Prerequisite:** Elementary Zoology and one collegiate course in Chemistry. Ecology of lakes, streams and ponds, with emphasis on the physical, chemical and biotic factors which determine their biological productivity. Stress is placed on Flathead Lake but studies are conducted on reservoirs, high altitude lakes and glacial waters of Glacier National Park.  
Laboratory 1, Monday, Friday. Brunson.
- S164. **Natural History of Invertebrates.** 3 credits. **Prerequisite:** Invertebrate Zoology. The ecology, taxonomy and distribution of the invertebrates of the Rocky Mountain area. Although all invertebrates other than insects and helminths are studied, emphasis is placed upon the molluscs of the region.  
Laboratory 1, Tuesday. Brunson.
- S165. **Entomology.** 6 credits. **Prerequisite:** Two laboratory courses in Zoology, including invertebrate zoology. Introduction to the morphology, physiology, taxonomy and ecology of the Insecta.  
Laboratory 2, Monday, Thursday. Castle.
- S167. **Ichthyology.** 3 credits. **Prerequisite:** Comparative Vertebrate Anatomy. The classification, natural history and distribution of fishes, with special reference to those of the region.  
Laboratory 1, Wednesday. Instructor to be announced.
- S199. **Special Problems in Zoology.** 2 to 5 credits. **Prerequisite:** Adequate background courses in the subject and consent of the professor. Opportunity is available for students to pursue work under the guidance of the professor in the field of interest. Staff.
- S200. **Advanced Zoological Problems.** Credit variable. **Prerequisite:** Consent of professor. Opportunity is given graduate students with sufficient preparation and ability to pursue original investigations. Staff.
- S261. **Limnological Methods.** 3 credits. **Prerequisite:** Graduate standing, limnology, and at least one year of collegiate chemistry. A course which provides field and laboratory practice in standard procedures employed in limnological investigations. Brunson.  
(Omitted in 1948.)



Mission Range



# INFORMATION FOR 1948 SESSION

## Enrolling

Enrollment for the 1948 session will be limited to 50 students. The size of each class will be limited so as to make the most efficient use of materials and equipment on hand. Therefore, when applying for admission, each student should show a first and second choice of schedule of courses or problems. The schedule should be arranged so that a free day follows at least one day in each course. This is necessary in order to plan on certain two-day trips without interfering with other course work. Enrolling permits, showing whether first or second choice was granted, will be mailed as soon as action has been taken by the Executive Committee.

## Equipment Needed

The student is responsible for supplying his own bedding, linens, toilet articles and proper clothing. As a rule, summer rains will come the last week of June and the first week of July. However, local showers occur in high altitudes, so that rain equipment that is light to carry is desirable. Nights are cool, and temperatures are low at high altitudes. Therefore, a student should be supplied with warm clothing, preferably wool. Since many of the classes will do mountain climbing during the course of the summer, students are strongly advised to have adequate foot wear. For those intending to do aquatic work, tennis shoes or hip boots will probably be the best type of foot wear. Regular mountain boots are advisable for climbing. Recreational equipment should be supplied by individual students.

Books and class supplies can be obtained from student book store supplies.

Since the Station area is a game reserve, dogs and other pets are not allowed. Firearms may not be brought on the premises without advance, written permission from the Director.

## Remunerative Work

Opportunities for work are not many. Graduate assistantships are available in most of the courses. To be eligible for one of these assistantships, a student should have had the course or its equivalent in some other institution. There will be opportunity to work by the day and by the hour at janitor work, kitchen duties, day labor at the Station grounds, and driving trucks or busses. Applications for work should be sent to the Director.

# APPLICATION FOR ADMISSION

## MONTANA STATE UNIVERSITY BIOLOGICAL STATION

Missoula, Montana

SUMMER SESSION, 1948

Name ..... Age.....  
Last First Middle

Mailing Address .....

Graduate..... Undergraduate..... Year..... Major Field.....

Institutions previously attended (with year of graduation):

College or University.....

Degrees with Dates.....

Veteran.....; PL 16....., PL 346.....

If a member of some instructional staff, give status:.....

Schedule of Classes Desired:

First Choice: 1. ....

2. ....

3. ....

Second Choice: 1. ....

2. ....

3. ....

If Research Work: (a) Independent....., (b) Under Supervision.....

If under supervision, with whom or in what field?.....

Tent house requirement:

Roommate preferences .....

If married, will wife or family accompany you?.....

If so, give number and ages of children.....

(Instructions for arrival and other pertinent information will be mailed to applicants.)



